D H E C
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

STATEMENT OF BASIS

BAQ Engineering Services Division
2600 Bull Street, Columbia, SC 29201
Phone: 803-898-4123 Fax: 803-898-4079

Company Name:	Starbucks Manufacturing Corporation	**Permit Writer:**	Samuel Zammarrelli, III
Permit Number:	0460-0027-CA.R1	**Date:**	March 16, 2009

DATE APPLICATION RECEIVED: April 21, 2008

FACILITY DESCRIPTION

Starbucks Manufacturing Corporation is a coffee roasting facility that will produce roasted coffee, either ground or whole. Operations at this facility will consist of green bean cleaning, green bean handling, roaster system, and roasted bean handling. Some of the green beans will be received already decaffeinated so no decaffeination of the beans will occur at this facility.

PROJECT DESCRIPTION

The facility would like to request several changes to construction permit CA. These changes are as follows:

1. Change in name for the roasters from R1, R2, R3, R4, R5, and R6 to R1, R2A, R2B, R3, R4, and R5.
2. Change R1, R2A, and R2B to the EN2000 model and R3, R4, and R5 to the EN1500 model.
3. Change in name for the control devices from CATOX1, CATOX2, CATOX3, CATOX4, CATOX5, and CATOX6 to CATOX1, CATOX2A, CATOX2B, CATOX3, CATOX4, and CATOX5.
4. Change in name for the roaster receivers RR1, RR2, RR3, RR4, RR5, and RR6 to RR1, RR2A, RR2B, RR3, RR4, and RR5.
5. Change in name for the cooling trays from C1, C2, C3, C4, C5, and C6 to C1, C2A, C2B, C3, C4, and C5.
6. Change in name for the control devices from CT1, CT2, CT3, CT4, CT5, and CT6 to CT1, CT2A, CT2B, CT3, CT4, and CT5.
7. Control Device HEAP to be changed to a pair of cyclones in series (CHAFF1 and CHAFF2). CHAFF 1 will control hot and cold chaff collection from roasters R1, R2A, and R2B. CHAFF 2 will control hot and cold chaff collection from roasters R3, R4, and R5.
8. The stack height of control devices CHAFF1, CHAFF2, GC1, and GD1 will now be 50 feet.
9. A filter cartridge cleaning system will be added to exhaust to the Green Dust Conveying collector GC1.
10. Two emergency generators listed in exempt sources, EmGen2 and EmGen3, be voided.
11. Add one (1) laboratory hood as an exempt source (SC Reg. 61-62.1,Section II(B)(2)(d)).
12. Quarterly calibration checks as opposed to weekly calibration checks for the inlet and outlet thermocouples as mentioned in SC Reg. 61-62.5, Standard 3, Section VII (This request has been approved).
13. Change the number and configuration of the exempt space heaters. SH1–SH20 should be replaced by:
    a. (SH1–SH6) Six (6) natural gas-fired Space Heaters (w/ evaporative condensers for comfort air conditioning) rated at 0.602 million BTU/hr input capacity
    b. (SH7) One (1) natural gas-fired Space Heater (w/ evaporative condenser for comfort air conditioning) rated at 1.22 million BTU/hr input capacity
    c. (SH8–SH20) Thirteen (13) natural gas-fired Space Heaters ranging from 0.045 to 0.48 million BTU/hr input capacity
14. Installation of a rain deflector at the outlet of the facility's stacks (The rain deflector will have no impact on the vertical flow exhaust from the stacks).
15. Compliance test reports be submitted within 45 days of the test instead of the 30 days required by Condition 26 in the original construction permit (This request has been approved by the Source Evaluation section, based upon SC Reg. 61-62.1, Section IV(F)(1)).
16. The facility would like to verify that initial raw gas testing is not needed. The initial raw gas testing is described as testing the emissions before the control device is add. (BAQ has approved.)

SOURCE TEST REQUIREMENTS

In accordance with SC Regulation 61-62.5, Std. 3, an initial source test for PM emissions shall be conducted within 180 days after startup and every two (2) years thereafter. Testing shall be conducted so that one of each model catalytic oxidizer is tested and after three tests all catalytic oxidizers have been tested.
In accordance with SC Regulation 61-62.1, Section II (G), an initial source test for NO_x, CO, VOC, and formaldehyde emissions shall be conducted within 180 days after startup and as required by the Bureau. Testing shall be conducted so that one of each model catalytic oxidizer is tested.
Also, the minimum operating temperature will be established during the initial source test for each model catalytic oxidizer.

SPECIAL CONDITIONS, MONITORING, LIMITS

The facility will now also have federally enforceable limits of less than 250 TPY for VOCs in addition to the current 100 TPY limit for VOCs and less than 10 TPY for any one HAP and less than 25 TPY for the total combined HAPs.

PUBLIC NOTICE

This permit will need to go on public notice to federally enforce the 250 TPY limit for VOCs that is needed to avoid PSD. This was placed on public notice from October 9, 2008 through November 7, 2008. Adverse public comments were received by DHEC on October 10, 2008. These comments have been responded to in a meeting on November 6, 2008 and along with follow up e-mails and phone conversations. DHEC's decision to issue this permit has been made after consideration and a complete review of the following: the air permit application, applicable state and federal air quality regulations, written comments received on November 6, 2008, and all other pertinent information.

EMISSIONS

This section addresses the changes in emissions from the initial construction permit CA. All other emissions that were addressed in the initial construction permit greensheet but not included below have remained at the same emission rate.

UNCONTROLLED POTENTIAL EMISSIONS (PROJECT ONLY)				
ID	**Pollutant**	**lb/hr**	**TPY**	**Method for Estimating Emissions**
R1	PM/PM_{10}	9.22	40.365	• PM/PM_{10}, VOC, Formaldehyde, and Acetaldehyde emissions were back calculated using a 96% control efficiency from the stack test results. • SO_2 – AP-42, Table 1.4-2, natural gas combustion • NO_x - Stack test results performed at a similar facility • CO - AP-42, Table 9.13.2-2 for batch process with thermal oxidizer.
	SO_2	0.0069	0.030	
	NO_x	3.46	15.15	
	CO	31.68	138.76	
	VOCs	23.0	100.74	
	Formaldehyde	1.73	7.58	
	Acetaldehyde	0.092	0.41	
R2A	PM/PM_{10}	9.22	40.365	• PM/PM_{10}, VOC, Formaldehyde, and Acetaldehyde emissions were back calculated using a 96% control efficiency from the stack test results. • SO_2 – AP-42, Table 1.4-2, natural gas combustion • NO_x - Stack test results performed at a similar facility • CO - AP-42, Table 9.13.2-2 for batch process with thermal oxidizer.
	SO_2	0.0069	0.030	
	NO_x	3.46	15.15	
	CO	31.68	138.76	
	VOCs	23.0	100.74	
	Formaldehyde	1.73	7.58	
	Acetaldehyde	0.092	0.41	

UNCONTROLLED POTENTIAL EMISSIONS (PROJECT ONLY)				
ID	**Pollutant**	**lb/hr**	**TPY**	**Method for Estimating Emissions**
R2B	PM/PM_{10} SO_2 NO_x CO VOCs Formaldehyde Acetaldehyde	9.22 0.0069 3.46 31.68 23.0 1.73 0.092	40.365 0.030 15.15 138.76 100.74 7.58 0.41	• PM/PM_{10}, VOC, Formaldehyde, and Acetaldehyde emissions were back calculated using a 96% control efficiency from the stack test results. • SO_2 – AP-42, Table 1.4-2, natural gas combustion • NO_x - Stack test results performed at a similar facility • CO - AP-42, Table 9.13.2-2 for batch process with thermal oxidizer.
R3	PM/PM_{10} SO_2 NO_x CO VOCs Formaldehyde Acetaldehyde	7.2 0.0054 2.7 24.75 18.0 1.35 0.075	31.536 0.02 11.83 108.41 78.84 5.913 0.33	• PM/PM_{10}, VOC, Formaldehyde, and Acetaldehyde emissions were back calculated using a 96% control efficiency from the stack test results. • SO_2 – AP-42, Table 1.4-2, natural gas combustion • NO_x - Stack test results performed at a similar facility • CO - AP-42, Table 9.13.2-2 for batch process with thermal oxidizer.
R4	PM/PM_{10} SO_2 NO_x CO VOCs Formaldehyde Acetaldehyde	7.2 0.0054 2.7 24.75 18.0 1.35 0.075	31.536 0.02 11.83 108.41 78.84 5.913 0.33	• PM/PM_{10}, VOC, Formaldehyde, and Acetaldehyde emissions were back calculated using a 96% control efficiency from the stack test results. • SO_2 – AP-42, Table 1.4-2, natural gas combustion • NO_x - Stack test results performed at a similar facility • CO - AP-42, Table 9.13.2-2 for batch process with thermal oxidizer.
R5	PM/PM_{10} SO_2 NO_x CO VOCs Formaldehyde Acetaldehyde	7.2 0.0054 2.7 24.75 18.0 1.35 0.075	31.536 0.02 11.83 108.41 78.84 5.913 0.33	• PM/PM_{10}, VOC, Formaldehyde, and Acetaldehyde emissions were back calculated using a 96% control efficiency from the stack test results. • SO_2 – AP-42, Table 1.4-2, natural gas combustion • NO_x - Stack test results performed at a similar facility • CO - AP-42, Table 9.13.2-2 for batch process with thermal oxidizer..
C1	PM/PM_{10}	13.25	58.04	Back calculated using a 96% control efficiency from the stack test results.
C2A	PM/PM_{10}	13.25	58.04	Back calculated using a 96% control efficiency from the stack test results.
C2B	PM/PM_{10}	13.25	58.04	Back calculated using a 96% control efficiency from the stack test results.
C3	PM/PM_{10}	10.35	45.33	Back calculated using a 96% control efficiency from the stack test results.
C4	PM/PM_{10}	10.35	45.33	Back calculated using a 96% control efficiency from the stack test results.
C5	PM/PM_{10}	10.35	45.33	Back calculated using a 96% control efficiency from the stack test results.
RH, SH	PM/PM_{10}	10.25	44.90	Back calculated using a 96% control efficiency based on information from a similar facility

UNCONTROLLED POTENTIAL EMISSIONS (PROJECT ONLY)				
ID	**Pollutant**	**lb/hr**	**TPY**	**Method for Estimating Emissions**
SR, BBR, RR1, RR2A, RR2B, RR3, RR4, RR5	PM/PM_{10}	5.75	25.19	Back calculated using a 96% control efficiency based on information from a similar facility
HCC1, HCC2A, HCC2B	PM/PM_{10}	3.56	15.59	Back calculated using a 96% control efficiency based on information provided by the manufacturer (lbs/hr) = [(0.206 lbs/hr)/(0.04)] – [(3)(0.53 lbs/hr)] (lbs/hr) = 3.56 lbs/hr
HCC3, HCC4, HCC5	PM/PM_{10}	3.91	17.13	Back calculated using a 96% control efficiency based on information provided by the manufacturer (lbs/hr) = [(0.206 lbs/hr)/(0.04)] – [(3)(0.414 lbs/hr)] (lbs/hr) = 3.91 lbs/hr

CONTROLLED POTENTIAL EMISSIONS (PROJECT ONLY)				
ID	**Pollutant**	**lb/hr**	**TPY**	**Method for Estimating Emissions**
R1 (CATOX1)	PM/PM_{10} SO_2 NO_x CO VOCs Formaldehyde Acetaldehyde	0.36864 0.0069 9.45 1.27 0.92 0.0691 0.0037	1.615 0.030 41.39 5.56 4.03 0.303 0.0162	Stack test results performed at a similar facility
R2A (CATOX2A)	PM/PM_{10} SO_2 NO_x CO VOCs Formaldehyde Acetaldehyde	0.36864 0.01 9.45 1.27 0.92 0.0691 0.0037	1.615 0.030 41.39 5.56 4.03 0.303 0.0162	Stack test results performed at a similar facility
R2B (CATOX2B)	PM/PM_{10} SO_2 NO_x CO VOCs Formaldehyde Acetaldehyde	0.36864 0.0069 9.45 1.27 0.92 0.0691 0.0037	1.615 0.030 41.39 5.56 4.03 0.303 0.0162	Stack test results performed at a similar facility

CONTROLLED POTENTIAL EMISSIONS (PROJECT ONLY)				
ID	**Pollutant**	**lb/hr**	**TPY**	**Method for Estimating Emissions**
R3 (CATOX3)	PM/PM_{10} SO_2 NO_x CO VOCs Formaldehyde Acetaldehyde	0.288 0.0054 7.38 0.99 0.72 0.054 0.003	1.26 0.02 32.32 4.34 3.15 0.24 0.0131	Stack test results performed at a similar facility
R4 (CATOX4)	PM/PM_{10} SO_2 NO_x CO VOCs Formaldehyde Acetaldehyde	0.288 0.0054 7.38 0.99 0.72 0.054 0.003	1.26 0.02 32.32 4.34 3.15 0.24 0.0131	Stack test results performed at a similar facility
R5 (CATOX5)	PM/PM_{10} SO_2 NO_x CO VOCs Formaldehyde Acetaldehyde	0.288 0.0054 7.38 0.99 0.72 0.054 0.003	1.26 0.02 32.32 4.34 3.15 0.24 0.0131	Stack test results performed at a similar facility
C1 (CT1)	PM/PM_{10}	0.53	2.32	Stack test results performed at a similar facility
C2A (CT2A)	PM/PM_{10}	0.53	2.32	Stack test results performed at a similar facility
C2B (CT2B)	PM/PM_{10}	0.53	2.32	Stack test results performed at a similar facility
C3 (CT3)	PM/PM_{10}	0.414	1.81	Stack test results performed at a similar facility
C4 (CT4)	PM/PM_{10}	0.414	1.81	Stack test results performed at a similar facility
C5 (CT5)	PM/PM_{10}	0.414	1.81	Stack test results performed at a similar facility
RH, SH (GC1)	PM/PM_{10}	0.41	1.8	Based on information from a similar facility
SR, BBR, RR1, RR2A, RR2B, RR3, RR4, RR5 (GD1)	PM/PM_{10}	0.23	1.01	Based on information from a similar facility

Company Name:	Starbucks Manufacturing Corporation	**Permit Writer:**	Samuel Zammarrelli, III
Permit Number:	0460-0027-CA.R1	**Date:**	March 16, 2009

CONTROLLED POTENTIAL EMISSIONS (PROJECT ONLY)

ID	Pollutant	lb/hr	TPY	Method for Estimating Emissions
CT1, CT2A, CT2B, HCC1, HCC2A, HCC2B (CHAFF1)	PM/PM_{10}	0.206	0.90	Known: One leg = 600 ACFM (Total air flow to system = 1200 ACFM) Outlet grain loading = 0.04 grain/dscf 1 lb = 7,000 grains Calculation: (lbs/hr) = (1,200 ft^3/min)(60 min/hr)(0.04 grains/ ft^3)(0.000143 lb/grain) (lbs/hr) = 0.206 lbs/hr
CT3, CT4, CT5, HCC3, HCC4, HCC5 (CHAFF2)	PM/PM_{10}	0.206	0.90	Known: One leg = 600 ACFM (Total air flow to system = 1200 ACFM) Outlet grain loading = 0.04 grain/dscf 1 lb = 7,000 grains Calculation: (lbs/hr) = (1,200 ft^3/min)(60 min/hr)(0.04 grains/ ft^3)(0.000143 lb/grain) (lbs/hr) = 0.206 lbs/hr

FACILITY WIDE EMISSIONS

Pollutant	Uncontrolled Emissions	Controlled Emissions
	TPY	TPY
PM/PM_{10}	412.92 (originally 442.9)	25.61 (originally 18.55)
SO_2	0.15	N/A
NO_x	86.29	226.48[1]
CO	749.37	37.53
VOCs	538.74 (originally 230.11)[2]	21.55 (originally 10.08)[2]
Formaldehyde (H, T, V)	40.479 (originally 2.31)	1.63 (originally 0.09)
Acetaldehyde (H, T, V)	2.16	0.09
Chromium (H)	0.000876	N/A
Manganese (H, T)	0.000876	N/A
Nickel (T)	0.0000876	N/A
Total HAPs	42.639 (originally 4.47)[3]	1.72 (originally 0.18)

[1] Uncontrolled NOx emissions will be lower than controlled because uncontrolled rates are based on the combustion of natural gas in the roaster only and accounts for no emissions coming from the catalytic oxidizer since it is a control device.

[2] The facility has already taken a federally enforceable limit of less than 100 TPY of VOCs in the initial construction permit. Because the uncontrolled VOC is now greater than 250 TPY, VOCs must also have a federally enforceable limit of less than 250 TPY.

[3] The increase in VOC emissions is based upon the source test submitted with this request, which is a better representation of the type of product at the facility.

[4] The source test used to estimate emissions at the facility also shows an increase in Formaldehyde. This increase has made the facility major for HAPs. The facility has agreed to take a federally enforceable limit of less than 10/25 TPY for HAPs.

The changes requested at this time have only affected the following :

PROJECT REGULATORY APPLICABILITY REVIEW			
Regulation	**Applicable**		**Comments**
	Yes	**No**	
South Carolina Regulation 61-62.1 through 62.99: Air Pollution Regulations (PROJECT ONLY)			
Standard 2: Ambient Air Quality Standards	X		This facility has demonstrated compliance through modeling: see modeling summary dated 8/19/2008. NO_x modeled emission rates are based on the annualized emission rate (based on a 100 TPY limit for the facility). The facility was modeled by the Bureau at a higher rate for SO_2 than what was proposed in the application. The emission rates that the Bureau modeled for SO_2 were typographical errors but are more conservative than what was submitted by the facility. If the facility expands and needs to submit a construction permit application that includes additional modeling, the facility can request that the rates be changed at that time.
Standard 7(c): Ambient Air Increments	X		This facility has demonstrated compliance through modeling for the PSD Class II increments for Calhoun County, see modeling summary dated 8/19/2008. NO_x modeled emission rates are based on the annualized emission rate (based on a 100 TPY limit for the facility). The facility was modeled by the Bureau at a higher rate for SO_2 than what was proposed in the application. The emission rates that the Bureau modeled for SO_2 were typographical errors but are more conservative than what was submitted by the facility. If the facility expands and needs to submit a construction permit application that includes additional modeling, the facility can request that the rates be changed at that time.
Standard 8: Toxic Air Pollutants (state only)	X		This facility has demonstrated compliance through modeling for all TAPs; see modeling summary dated 8/19/2008.

SUMMARY AND CONCLUSIONS

It has been determined that this source, if operated in accordance with the submitted application, will meet all applicable requirements and emission standards.